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Sex-Dimorphic Face Shape Preference in Heterosexual and Homosexual Men and Women

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Abstract Studies have used manipulated faces to test the preferences of heterosexual individuals for sexually dimorphic facial cues. In contrast to previous studies, which have generally excluded homosexual participants, we directly compared homosexual and heterosexual male and female preferences for manipulated sexual dimorphism in faces (homosexual males: $n = 311$; heterosexual males: $n = 215$; homosexual females: $n = 159$; heterosexual females: $n = 218$). Prior studies on sexual orientation and preferences for faces that were paired with masculine and feminine behavioral descriptors suggest that homosexual men prefer more masculine men and that homosexual women demonstrate no preference for either masculinity or femininity in women. In our study, we tested for similarities and differences among heterosexual and homosexual males and females with regard to their preferences for a more specific aspect of faces: sexual dimorphism of face shape. Homosexual men demonstrated stronger preferences for masculinity in male faces than did all of the other groups. Homosexual women demonstrated stronger preferences for masculinity in female faces than did heterosexual women. These results suggest attractiveness judgments of same-sex faces made by homosexual individuals are not a mirror image of those made by heterosexual individuals of the opposite sex. Our data suggest that face preferences of homosexual individuals reflect a system of biologically and socially guided preferences at least as complex as those found among heterosexual individuals.

Keywords Face · Attractiveness · Homosexual · Heterosexual · Masculinity · Femininity · Sociosexual Orientation Inventory

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Introduction

Studies of preferences for sexual dimorphism in faces among heterosexual raters suggest preferences evolved to maximize potential benefits of mate choices (for reviews, see Feinberg, 2008; Fink & Penton-Voak, 2002; Jones et al., 2008; Little & Perrett, 2002). Similar interpretations of preferences for sexual dimorphism in voices (for review, see Feinberg, 2008) and bodies (Little, Jones, & Burriss, 2007) have also been proposed.

Masculine facial characteristics are positively associated with indices of male health (Rhodes, Chan, Zebrowitz, & Simmons, 2003; Thornhill & Gangestad, 2006) and dominance (Mueller & Mazur, 1996). While masculinity in male faces may cue dominance and health, masculine men are less likely to invest in offspring and relationships than are relatively feminine men (Boothroyd, Jones, Burt, DeBruine, & Perrett, 2008; Burnham et al., 2003; Gray, 2003; Gray et al., 2004; Gray, Kahlenberg, Barrett, Lipson, & Ellison, 2002). Moreover, masculine men are more interested in pursuing short-term relationships than are relatively feminine men (Boothroyd et al., 2008; Rhodes, Simmons, & Peters, 2005). Female preferences for masculinity in male faces are modulated by a

large number of factors, including menstrual cycle phase and state hormone levels (Frost, 1994; Johnston, Hagel, Franklin, Fink, & Grammer, 2001; Jones, Little et al., 2005; Penton-Voak et al., 1999; Welling et al., 2007), hormonal contraceptives (Cornwell et al., 2004; Feinberg, DeBruine, Jones, & Little, 2008; Little, Jones, Penton-Voak, Burt, & Perrett, 2002), body morphology (Penton-Voak et al., 2003; Scarbrough & Johnston, 2005), self-perceived attractiveness (Little, Burt, Penton-Voak, & Perrett, 2001; Little & Mannion, 2006), and sex drive (Welling, Jones, & DeBruine, 2008). Variations in female preferences for masculine men (i.e., those with masculine face and body shapes and those with low vocal frequencies) may function to maximize the benefits of female mate choices (e.g., by increasing offspring health or reducing mate search time) (Feinberg, 2008; Jones et al., 2008).

Potential adaptations are also evident in male preferences for female facial femininity (Jones, DeBruine, Little, & Feinberg, 2007; Perrett et al., 1998; Welling et al., 2008). Facial femininity is positively associated with indices of female reproductive health (Law-Smith et al., 2006; Penton-Voak et al., 2003). Although male preferences for sexually dimorphic face cues are relatively stable in comparison to female preferences, men alter their face preferences based on social feedback (Jones, DeBruine, Little, Conway et al., 2007; Jones et al., 2008; Little, Burriss, Jones, DeBruine, & Caldwell, 2008). Individual differences in male preferences may maximize the benefits of choices by reducing mate search time or by increasing the efficiency with which men allocate their mating resources (Jones, DeBruine, Little, Conway et al., 2007; Jones et al., 2008; Little, Burriss et al., 2008).

Studies of dating advertisements suggest that homosexual men prefer masculine men more than do heterosexual women, and that homosexual women prefer feminine women more than do heterosexual men (Bailey, Kim, Hills, & Linsenmeier, 1997; Child, Low, McCormick, & Cocciarella, 1996; Lippa, 2007). Also, among homosexual and heterosexual men and women, neural reward systems associated with viewing attractive faces (Kampe, Frith, Dolan, & Frith, 2001; O'Doherty et al., 2003) were more active when viewing preferred-sex faces than when viewing non-preferred-sex faces (Ishai, 2007; Kranz & Ishai, 2006). Thus, preferences for facial sexual dimorphism may differ between heterosexual and homosexual individuals. To the best of our knowledge, however, only one previous study has investigated similarities and differences between homosexual and heterosexual male and female preferences for masculinity, assessing preferences for faces paired with vignettes illustrating whether the person was behaviorally masculine or feminine (Bailey et al., 1997). This study found that homosexual men preferred men who were described to be masculine more than they preferred men who were described to be feminine. Homosexual women, on the other hand, showed no consistent bias in their preferences for masculine versus feminine women.

A potential limitation of Bailey et al. (1997) is that the study used vignettes describing behavioral masculinity rather than objective manipulations of sexually dimorphic characteristics. Therefore, it is unclear if the effects reported by Bailey et al. extend to face preferences. Thus, we compared homosexual and heterosexual male and female preferences for masculinized and feminized male and female faces. Following previous studies of preferences for facial masculinity (Little & Hancock, 2002; Little & Mannion, 2006; Penton-Voak, Perrett, & Peirce, 1999; Perrett et al., 1998), face stimuli were manufactured using computer graphics methods that objectively and systematically manipulate sexual dimorphism of two-dimensional shape cues in facial images. Following Bailey et al. (1997), we hypothesized that aggregate analyses of homosexual men would show preferences for male facial masculinity and that homosexual women may not show preferences for facial masculinity or femininity.

Levels of sociosexuality vary between heterosexual and homosexual individuals (Bailey, Gaulin, Agyei, & Gladue, 1994). Among heterosexual individuals, less restricted women (i.e., individuals who are more open to short-term relationships) prefer masculine male bodies (Provost, Kormos, Kosakoski, & Quinsey, 2006) and faces (Waynforth, Delwadia, & Camm, 2005) more than do more restricted individuals (i.e., individuals who are less open to short-term relationships), but these findings do not necessarily extend to female preferences for male facial masculinity. To our knowledge, no previous studies have tested for possible relationships between sociosexuality and male preferences for feminine women. Nor have any studies tested for possible relationships between sociosexuality and preferences for sexual dimorphism among homosexual individuals. Men with increased masculinity and women with increased femininity tend to report less restricted sexual behavior than those with decreased sexual dimorphism (Boothroyd et al., 2008; Rhodes et al., 2005). Therefore, individuals with less restricted sociosexual profiles may prefer increased sexual dimorphism. To determine if people with less restricted sociosexual profiles prefer increased sexual dimorphism, we tested for associations between sociosexuality and preferences for sexual dimorphism in each group of participants (homosexual and heterosexual men and women). We predicted that individuals with less restricted sociosexual profiles would show stronger preferences for masculinity among male faces and femininity among female faces as compared to individuals with more restricted sociosexual profiles.

Method

Participants

A total of 903 participants were recruited online (M age = 32.0 years, SD = 11.3 years). Of these, 215 men (M age =

32.33 years, $SD = 11.11$) and 218 women (M age = 30.55 years, $SD = 9.27$) identified themselves as heterosexual, and 311 men (M age = 34.85 years, $SD = 12.30$) and 159 women (M age = 28.91 years, $SD = 9.85$) identified themselves as homosexual. Sexual orientation was determined by asking participants to select one of seven statements that best described their sexual orientation. The seven statements provided in the survey were taken from the Kinsey scale (Kinsey, Pomeroy, & Martin, 1948).

To separate our population into its four groups (homosexual and heterosexual male and female), we coded the Kinsey scale data such that individuals who rated themselves as "exclusively homosexual" and "predominantly homosexual, only incidentally heterosexual" were classified as homosexual, whereas individuals who rated themselves as "exclusively heterosexual" and "predominantly heterosexual, only incidentally homosexual" were classified as heterosexual. Bisexual people were not the focus of this study, and people who scored along the other two points of the Kinsey scale were not brought into our data analysis.

Our participants came from a number of online sources where we posted advertisements asking for men and women who were interested in helping with a 20-min study on facial attractiveness. A total of 10.7% of participants were recruited through Harvard University and Harvard Business School research websites (of that group, 2.3% were undergraduate students at Harvard University and 8.4% of participants were non-students who were recruited by Harvard Business School to participate in online surveys). A total of 72.5% of our participants found our study while browsing online sites not associated with Harvard. Of those, 56% found the link to our study on the volunteer section of Craigslist, 19.7% of participants came to the study by clicking on Google advertisements, and the remainder of participants came from eight other websites that primarily involved social networking and gay and lesbian discussion (<8% per website). A total of 16.8% of our participants declined to specify where they found out about the study. A preliminary analysis showed that ethnicity, menstrual cycle, relationship context, and hormonal contraceptive use did not have any effect on the dependent measures, so these variables are not discussed further.

Measures and Procedure

We used standard computer graphics methods to manipulate the sexual dimorphism in facial images (Benson & Perrett, 1993; Rowland & Perrett, 1995; Tiddeman, Burt, & Perrett, 2001). Each face was delineated with 179 landmark points. To create endpoints of the manipulations, the shape, color, and texture of the faces of 50 men and 50 women faces were averaged. Next, we created 10 base-faces upon which the manipulations would be applied; each was comprised of three faces of random individuals from a different set of images than that which was used to create the endpoints. By using averages of three individuals, we were able to make each face more representative of the average male or female face, while still maintaining separate identities (Little & Hancock, 2002; Penton-Voak et al., 1999; Perrett et al., 1998). Next, we added ±50% of the linear differences in 2D shape between the male and female prototypes to each base face to manufacture masculinized and feminized versions. This process created 10 pairs of images in total (each pair consisted of a masculinized and feminized version of the same base face, which produced five male pairs and five female pairs). Finally, each individual face was averaged with its mirror image to control for symmetry (Little, DeBruine, Jones, & Feinberg, 2008; Little, Jones et al., 2008). Images were aligned to the average interpupillary distance. In prior studies, these manipulations have been shown to alter masculinity ratings in the predicted way (DeBruine et al., 2006; Penton-Voak, Jacobson, & Trivers, 2004; Penton-Voak & Perrett, 2000; Perrett et al., 1998; Rhodes, Hickford, & Jeffery, 2000). For an example of the face stimuli used in this study, see Fig. 1.

The study was conducted online (www.surveymonkey.com). To recruit participants, advertisements were placed on various websites described above. Research has demonstrated that laboratory-based and internet-based research on facial attractiveness yield consistent results (Feinberg et al., 2005; Jones, DeBruine, Little, Conway et al., 2007; Jones, Perrett et al., 2005; Welling et al., 2008; Wilson & Daly, 2004).

Participants indicated their sexual orientation and answered basic demographic questions. Each participant was shown the 10 pairs of faces sequentially (each pair consisting of a masculinized and feminized version of the same base face as shown in Fig. 1), and asked "Which face do you consider more attractive?" for each pair. The 10 pairs of faces were presented in a fully counterbalanced order. Further, the location of the masculinized and feminized face within each pair was also counterbalanced, meaning that masculinized faces were sometimes displayed on the left and sometimes were displayed on the right. Last, for approximately half of our participants, male face pairs were presented first. Female face pairs were presented first to the remaining participants. Participants who left the study without rating all faces were not included in the analyses.

Following face preference ratings, participants completed the Sociosexual Orientation Inventory (SOI) (Boothroyd et al., 2008; Simpson & Gangestad, 1991). The SOI consists of seven questions that assess tendencies to be inclined towards short- versus long-term relationships. It includes questions concerning both behavior and attitudes (see Table 1 for a list of questions in this scale along with a principal components analysis). Finally, we also asked female participants to answer questions about their use of birth control and the timing of their last period.

Fig. 1 Display of an example of masculinized (*right*) and feminized (*left*) versions of male (*top*) and female (*bottom*) faces used in this study. Although this is a global manipulation of the differences between male and female faces, key features that relate to sexual dimorphism are eyebrow size, jaw shape, and eye size, among other features (Perrett et al., 1998; Perrett, May, & Yoshikawa, 1994)

Results

We calculated the proportion of masculine faces chosen as more attractive than feminine faces separately for male and female faces (preference scores >.5 indicate preferences for masculine faces; preference scores <.5 indicate preferences for feminine faces; preference scores = .5 indicate no preference). We tested whether each group of participants preferred masculinized or feminized face images more than chance when judging the attractiveness of the faces of men and women. One-sample *t*-tests (chance = 0.5) indicated that both heterosexual and homosexual men preferred feminized versions over masculinized versions of the faces of women: heterosexual: $t(214) = -12.65$, $p < .001$; homosexual: $t(306) = -3.53$, $p < .001$. Heterosexual men preferred the faces of feminine men over the faces of masculine men, $t(214) = -3.78$, $p < .001$, whereas homosexual men preferred the faces of men that were masculinized over the faces of men that were feminized, $t(214) = 7.04$, $p < .001$. See Fig. 2 for a comparison between all groups.

One-sample *t*-tests also indicated that both heterosexual and homosexual women preferred the faces of women that were feminized to those that were masculinized: heterosexual: $t(217) = -15.08$, $p < .001$; homosexual: $t(157) = -7.27$, $p < .001$. Heterosexual women showed no preference for either masculinized or feminized male faces, $t(217) < 1$, whereas homosexual women preferred the faces of men that were feminized to the faces of men that were masculinized, $t(157) = -9.33$, $p < .001$.

To compare the strength of facial masculinity preferences, we conducted a 2 (Sex of Rater) × 2 (Sexual Orientation) × 2 (Sex of Stimuli) analysis of variance (ANOVA). The ANOVA yielded a significant three-way interaction between sex of rater, sexual orientation, and sex of stimuli on preferences for masculinized versus feminized faces, $F(1, 894) = 40.1$, $p < .001$.

Independent sample *t*-tests for male and female raters were carried out to interpret the three-way interaction. All Levine's tests for equality of variances were non-significant, with the exception of preferences of heterosexual women for masculinity in the faces of women, $F = 6.79$, $p = .01$. In the case where equal variances were not assumed, Brown–Forsythe *t*-tests with adjusted degrees of freedom were used. In all other cases, actual degrees of freedom were used.

We compared the facial masculinity preferences of heterosexual and homosexual women. These independent samples *t*-tests showed that heterosexual women demonstrated stronger preferences for male facial masculinity faces than did homosexual women, $t(375) = 6.77$, $p < .001$, and that homosexual women demonstrated significantly stronger preferences for female facial masculinity than did heterosexual women, Brown–Forsyth $t(303.38) = -2.92$, $p < .01$.

We compared the facial masculinity preferences of heterosexual and homosexual men. Homosexual men demonstrated stronger facial masculinity preferences than did heterosexual men for both male, $t(520) = -7.42$, $p < .001$, and female faces, $t(520) = -6.72$, $p < .001$.

We compared the preferences for facial masculinity among homosexual men and heterosexual women and compared preferences facial masculinity preferences among homosexual women and heterosexual men. Homosexual men showed stronger preferences for female facial masculinity, Levine's test for inequality of variance: $F = 6.89$, $p < .001$; Brown–Forsyth $t(510.13) = 8.15$, $p < .001$, and male facial masculinity, $t(524) = 4.37$, $p < .001$, than did heterosexual women. Homosexual women preferred male facial masculinity less than did heterosexual men, $t(372) = 4.37$, $p < .001$, and showed stronger preferences for female facial masculinity than did heterosexual men, $t(371) = -2.05$, $p < .05$.

Table 1 Rotated principal components for Sociosexual Orientation Inventory (Simpson & Gangestad, 1991)

Question	Attitudes	Behavior
How many sexual relationships have you had in the last 5 years?	.47	.60
With how many partners have you had sexual relationships in the last 5 years?	.58	.66
How often do you fantasize about having sex?	.47	−.13
How many one night stands have you had?	.42	.58
Sex without love is OK.	.77	−.39
I can imagine myself being comfortable and enjoying "casual sex" with different partners.	.82	−.35
I would have to be closely attached to someone (both emotionally and psychologically) before I could feel comfortable and fully enjoy having sex with him or her?	.76	−.33

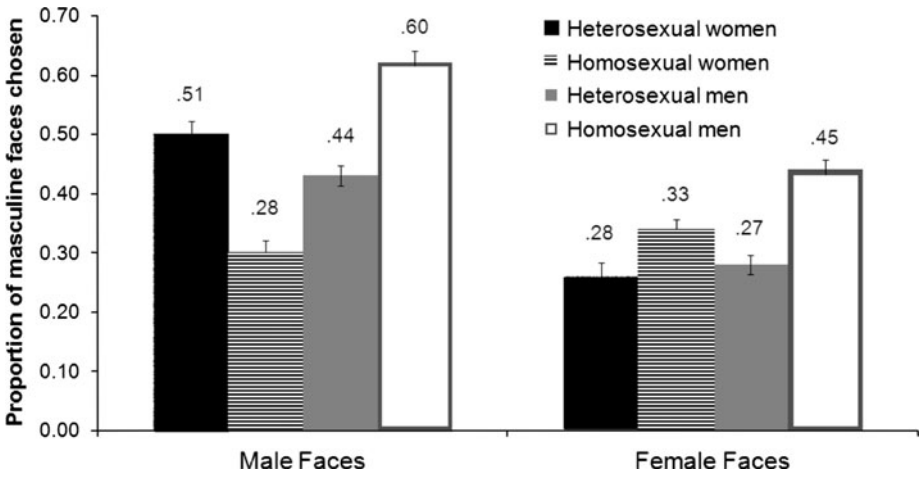

Fig. 2 Differences among heterosexual and homosexual male and female preferences for manipulated sexual dimorphism in male and female faces. *Bars* show means and SEMs

Sociosexual Orientation Inventory and Facial Preferences

Following Webster and Bryan (2007), we entered all SOI variables into a principal components analysis with varimax rotation. The PCA revealed two factors with eigenvalues >1. The first factor (explaining ∼40% of the variance) related most strongly to sexual attitudes, whereas the second factor (explaining ∼22% of the variance) related most strongly to sexual behaviors. These factors were used in subsequent analyses. See Table 1 for factor loadings.

Among heterosexual men, the attitude factor of the SOI was positively correlated with preferences for female facial femininity, $R(125) = .20, p < .05$. Those individuals who were less restricted preferred feminine female faces more than did restricted individuals. Among homosexual men, the sociosexuality attitude factor was also positively correlated with preferences for male facial masculinity, $R(259) = .17, p < .001$. All other correlations (i.e., those among women, and those using the behavior score of the SOI) were non-significant (all $R < .12$, all $p > .075$, which corresponds to sociosexual behavior marginally predicting the proportion of male faces where masculinity was chosen most attractive to heterosexual men).

Discussion

Heterosexual and homosexual men and women demonstrated similarities and differences in their preferences for sexual dimorphism in face shape. Heterosexual and homosexual men and women preferred female facial femininity to masculinity. Regarding ratings of male faces, heterosexual men preferred femininity, whereas homosexual men preferred masculinity. Heterosexual women demonstrated no preference for femininity or masculinity in male faces, whereas homosexual women preferred femininity in male faces. Homosexual men demonstrated stronger preferences for male facial masculinity than did heterosexual men and women. The preferences for female facial femininity among homosexual men were also significantly weaker than the preferences of both heterosexual men and women. Homosexual women preferred female facial femininity more than did homosexual men and

heterosexual women. These findings suggest that while homosexual preferences for same-sex faces and heterosexual preferences for opposite-sex faces are directionally similar, the strengths of these preferences vary depending on sex of the rater, sexual orientation, and the sex of the face being rated.

Bailey et al. (1997) suggested a number of hypotheses that relate to why homosexual masculinity preferences may be similar or different than heterosexual preferences. The first hypothesis is that homosexual people tend to be more open to sex-atypical behavior and, because they are more accepting of sex-atypical sexual partners, may not prefer sexual dimorphism in partners. Neither our data nor those reported by Bailey et al. supported this hypothesis. We found that homosexual men had stronger preferences for male facial masculinity and homosexual women had stronger preferences for female facial femininity than would be expected by chance, indicating homosexual men and women preferred exaggerated sex-typical appearance in potential partners' faces.

The second hypothesis proposed by Bailey et al. (1997) was that homosexual male preferences mirror heterosexual female preferences, whereas homosexual female preferences mirror heterosexual male preferences. This hypothesis appears to be the most relevant to our data. We found that although the direction of preferences was similar between the aforementioned groups, the strength of preferences was not always as predicted by Bailey et al. Homosexual men had stronger preferences for male facial masculinity than did heterosexual women. It may be that this indicates that homosexual men truly prefer male masculinity more than do heterosexual women. However, this interpretation of our results requires careful consideration. Indeed, heterosexual female preferences for male facial masculinity are highly variable, depending on a number of trait, state, physical, and psychological variables described in the introduction. Thus, if generalized preferences for sexual dimorphism among women categorize the individual sample from which they are drawn more than reflecting preferences in general, then there may be no a priori preferences from heterosexual women with which to compare to those from homosexual men or women. Similarly, homosexual women preferred female facial femininity less than did heterosexual men. These results could be qualified by a number of factors related to individual differences in female preferences. Indeed, while we found sociosexuality predicted male but not female preferences, there could be a number of factors that may qualify our results. We discuss this further below.

Another hypothesis proposed by Bailey et al. (1997) is that homosexual male and female preferences for sexual dimorphism in same-sex individuals are solely dictated by their own masculinity. Although the data reported here did not explicitly test this hypothesis, we did investigate how sociosexuality may predict preferences for facial sexual dimorphism. This may serve as an indirect indicator of how individual masculinity might predict facial masculinity preferences because masculine individuals tend to have less restricted sociosexual profiles than do feminine individuals (Boothroyd et al., 2008). Nevertheless, among heterosexual men, those with less restricted sociosexual preferences preferred femininity in both male and female faces to a greater degree than did more restricted men. Among homosexual men, those with less restricted sociosexual preferences preferred male facial masculinity more than did men with more restricted sociosexual preferences. Thus, regardless of sexual orientation, less sociosexually restricted men have stronger preferences for sexual dimorphism in the sex they prefer than more restricted men do. That we found no association between sociosexuality and female preferences for facial sexual dimorphism is consistent with other studies that also found no association between female sociosexuality and preferences for masculinity in male faces (Provost et al., 2006; cf. Waynforth et al., 2005). Given the diversity of sources of individual variation in female preferences for sexual dimorphism (for review, see Feinberg et al., 2008), we encourage future study on individual differences in homosexual and heterosexual preferences for facial masculinity.

In summary, this is the first study to address homosexual individuals' preferences for sexual dimorphism in faces using manipulated stimuli. It appears that preferences of homosexual men are not a reflection of the preferences of heterosexual women and the preferences of homosexual women are not a reflection of the preferences of heterosexual men. Our data suggest that the preferences of homosexual men are more comparable to the preferences of heterosexual men and the preferences of homosexual women are more comparable to the preferences of heterosexual women with regards to sexual dimorphism in faces because of the manner in which individual differences in preferences function. In other words, if homosexual preferences for same-sex faces are reflections of heterosexual preferences for opposite-sex faces, then we would have expected the sociosexual attitudes of homosexual men *not* to predict their preferences for facial masculinity. Instead, we found that the sociosexual attitudes of homosexual men *did* predict their preferences for masculinity in the faces of men. Thus, within each sex, homosexual and heterosexual preferences may be more similar than once thought.

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